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64,947/69 67.2 66.3 67.1
53,771/59 254,458 87.1 72.7 67.1

(57) Claim 1. A fluid motor or turbine including; a rotor having a plurality of pockets provided around its periphery and each being elongated in the circumferential direction of said rotor and having a depth radial of said rotor which increases progressively in said circumferential direction at least over part of the length of said pocket, said increase in depth being in the intended direction of rotation of said rotor; each said pocket being formed between spaced side walls forming part of or being attached to said rotor so that the pocket is open to entry and exit of fluid only at said periphery; a channel formed along each of two opposite longitudinal sides of each said pocket, each said channel being defined between the base of the pocket and a respective flange which overlies portion of that base, and a gap exists between the two said flanges; a stator having at least one race member arranged to extend around portion of said rotor periphery and having an inner surface adjacent said periphery and spaced therefrom by a clearance space, said portion extending over a distance around the circumference of said rotor greater than the circumferential length of the peripheral .../2

opening of a said pocket; and a fluid source arranged to introduce pressurized fluid into each said pocket as it approaches and/or enters an inlet end of said clearance space; said race member being operative to confine the said pressurized fluid received within each said pocket to substantially prevent escape of the fluid from the pocket until the pocket begins to emerge from an outlet end of said clearance space.

COMMONWEALTH OF AUSTRALIA. Form 7.

Patents Act 1952-1969

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT OR PATENT OF ADDITION.

In support of the Application made by JOHN THOMAS BLOOMER

31626/77

for a patent ~~patent of addition~~ for an invention entitled

Peripherally Motivated Turbine.

I, John Thomas Bloomer

of 103 Channel Highway, Taroona, Tasmania, 7006.

do solemnly and sincerely declare as follows:—

1. I am the applicant for the patent. ~~patent of addition~~

(*or, in the case of an application by a body corporate*)

~~I am authorised by~~

~~the applicant for the patent patent of addition to make this declaration on its behalf~~

2. I am the actual inventor of the invention.

(*or, where a person other than the inventor is the applicant*)

~~2.~~

~~of~~

~~is the actual inventor of the invention~~

~~and the facts upon which I am entitled the applicant is entitled to make the application are as follows:—~~

Declared at Hobart this 13th day of December 1977

To:

THE COMMISSIONER OF PATENTS.

J.T. Bloomer

(*Signature of Declarant.*)

(IMPORTANT.– Cross out inapplicable words in the above Form.)

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506745

PATENT OFFICE $10 TEN DOLLARS

PATENT OFFICE $16 SIXTEEN DOLLARS

COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1973

Form 1

APPLICATION FOR A PATENT

I ~~WE~~ JOHN THOMAS BLOCHER
(Use BLOCK letters)

31626/77

of 103 Channel Highway,

Taroona, Tasmania, 7006.

hereby apply for the grant of a Patent for an invention entitled

Peripherally Motivated Turbine.

which is described in the accompanying ~~provisional~~ complete specification.

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 22/11/79

My ~~Our~~ address for service is ~~103 Channel Highway,~~

~~Taroona, Tasmania. 7006~~

... FOR SERVICE

Phillips, Ormonde + Fitzpatrick Melbourne

Dated this Thirteenth day of December 1977.

To:

THE COMMISSIONER OF PATENTS

J.T.Blocher
(Signature)

This form must be accompanied by either a provisional specification (Form 9 and true copy) or by a complete specification (Form 10 and true copy).

AUSTRALIAN
15 DEC 1977
PATENT OFFICE

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AUSTRALIA

506745

Patents Act

COMPLETE SPECIFICATION

(ORIGINAL)

31626/77

Class | Int. Class

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Lodged:

Complete Specification Lodged:

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Published:

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and is correct for printing.

8 JAN 1980

Priority:

Related Art:

APPLICANT'S REF.: –

Name(s) of Applicant(s):

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Complete Specification for the invention entitled:

AUSTRALIAN PATENT OFFICE

"FLUID MOTOR OR TURBINE"

The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

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This invention relates to fluid motors or turbines as used in either static or mobile installations. An example application of a turbine according to the invention is in relation to vehicle drives.

Prior to the present invention few turbines have been capable of operating efficiently from a low pressure fluid source. Furthermore, prior turbines have generally been of relatively bulky construction making them unsuitable for use in mobile machinery.

It is a principal object of the present invention to provide a relatively efficient turbine which is usable in low pressure situations. A further object of the invention is to provide a light weight turbine construction. Still another object of the invention is to provide a simple and inexpensive turbine having the facility for convenient maintenance.

According to the present invention there is provided a fluid motor or turbine including; a rotor having a plurality of pockets provided around its periphery and each being elongated in the circumferential direction of said rotor and having a depth radial of said rotor which increases progressively in said circumferential direction at least over part of the length of said pocket, said increase in depth being in the intended direction of rotation of said rotor; each said pocket being formed between spaced side walls forming part of or being attached to said rotor so that the pocket is open to entry and exit of fluid only at said ~~periphery; a stator having at least one race member arranged~~ to extend around portion of said rotor periphery and having an inner surface adjacent said periphery and spaced therefrom by a clearance space, said portion extending over a distance around the circumference of said rotor greater than the circumferential length of the peripheral opening of a said pocket; and a fluid source arranged to introduce pressurized fluid into each said pocket as it approaches and/or enters an inlet end of said clearance space; said race member being operative to confine the said pressurized fluid received within each said pocket to substantially prevent escape of the fluid from the pocket until the pocket begins to emerge from an outlet end of said clearance space.

~~The essential features of the invention, and further~~

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periphery; a channel formed along each of two opposite longitudinal sides of each said pocket, each said channel being defined between the base of the pocket and a respective flange which overlies portion of that base, and a gap exists between the two said flanges; a stator having at least one race member arranged to extend around portion of said rotor periphery and having an inner surface adjacent said periphery and spaced therefrom by a clearance space, said portion extending over a distance around the circumference of said rotor greater than the circumferential length of the peripheral opening of a said pocket; and a fluid source arranged to introduce pressurized fluid into each said pocket as it approaches and/or enters an inlet end of said clearance space; said race member being operative to confine the said pressurized fluid received within each said pocket to substantially prevent escape of the fluid from the pocket until the pocket begins to emerge from an outlet end of said clearance space.

The essential features of the invention, and further optional features, are described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the features (whether they be essential or optional features) shown is not to be understood as limiting on the invention.

In the drawings:

Figure 1 is a semi-diagrammatic end view of one form

of turbine according to the invention;

Figure 2 is a cross-sectional view taken along line II-II of figure 1;

Figure 3 is a cross-sectional view taken along line III-III of figure 2;

Figure 4 is a partial cross-sectional view taken along line IV-IV of figure 1 and being shown on an enlarged scale;

Figure 5 is a partial sectional view taken along line V-V of figure 2 and being shown on an enlarged scale;

Figure 6 is a side view of ~~a different form of~~ the rotor ~~for~~ of the turbine of figures 1 to 3;

Figure 7 is a cross-sectional view taken along line VII-VII of figure 6;

Figures 8 to 10 are cross-sectional views taken along lines VIII-VIII, IX-IX and X-X respectively of figure 6.

The drawings show the turbine in semi-diagrammatic and not necessarily complete form. For example, exhaust means for fluid within the stator has not been shown, but a skilled person will readily appreciate how such means might be arranged and connected to the interior of the stator. In the example shown, the stator 2 includes a housing 3 formed of two circular plates 4 and 5 held in spaced relationship by peripheral wall section 6. One or both of the plates 4 and 5 may be releasably attached to the wall section 6 to allow access to the interior of the housing 3. An opening 7 is provided between each pair of adjacent ends of the wall portions 6 at diametrically opposed locations as shown in figure 1, and each opening 7 allows passage of a respective fluid conduit 8. It will be apparent that the housing 3 could take numerous other forms.

The rotor 9 is secured to a drive sleeve 11 which, in the construction shown, is rotatably supported on a shaft 10 secured to and extending out from the housing 3. The shaft 10 may extend through the housing plate 5 as shown so as to be secured to a boss 12 which is fixed to the plate 5. Bearings 33 and 34 of any suitable form are provided between the shaft 10 and sleeve 11 adjacent both ends of the shaft 10. The sleeve 11 may be connected in any appropriate manner to any device or mechanism to be driven by the turbine.

A plurality of pockets 13 (figure 3) are provided around

the periphery of the rotor 9 and each is open at that periphery as best seen in figure 5. Each pocket 13 is elongated in the circumferential direction of the rotor 9 and has a progressively increasing depth in the radial direction of the rotor 9. That increase in depth is in the same direction for each pocket 13, which is the intended direction of rotation of the rotor 9. It is preferred, as also shown in figure 5, that there is a relatively sharp increase in the pocket depth adjacent to the leading end 14 of each pocket 13 so as to define a region 15 of maximum depth having an arcuate base 16. It is also preferred that the leading end 14 is arcuate as shown to provide a concave surface against which pressurized fluid can impinge. The pockets 13 are arranged close to one another so that a narrow land 17 exists at the rotor periphery between each leading end 14 and the adjacent pocket trailing end 18.

In the particular construction shown, the rotor 9 is of hollow light weight construction and comprises two discs 19 and 20 separated by inner and outer spacer rings 21 and 22. The inner ring 21 may be welded or otherwise secured to the sleeve 11 and the discs 19 and 20 can be attached to both rings 21 and 22 by screws or other releasable or non-releasable fastening means. The base of each pocket 13 is formed by a strip of copper or other material bent into the desired configuration and fixed between the outer edge portions of the two discs 19 and 20. It will be appreciated that the rotor 9 could be formed in many other ways.

Two race members 23 are secured within the stator housing 3 at diametrically opposed positions as shown in figure 3, and a gap 24 exists between each pair of adjacent ends of those members. In alternative constructions, there may be one race member 23 or there may be more than two race members 23, but the construction shown is a preferred simple and balanced arrangement. Each race member 23 has an inner surface 25 which is adjacent the periphery of the rotor 9 and is spaced from that periphery by a clearance space 26. As best seen in figure 5, the clearance space 26 progressively decreases in the same direction as the depth of the pockets 13 increases, so that a zone 27 of minimum clearance is provided at or adjacent one end of the race member 23. That particular end

defines an outlet end 28 of the clearance space 26 and as shown there is preferably a progressive increase in the clearance space 26 from the zone 27 to the outlet end 28. It is also preferred that a relatively sharp decrease in the clearance space 26 exists over a portion 29 extending from the inlet end 30 of the space 26.

The taper of space 26 is somewhat exaggerated in figure 5 of the drawings for convenience of illustration. In practice, that taper may be quite small - e.g., a few thousands of an inch - over the complete length of the race 23. Furthermore, the taper may be omitted if desired so that the clearance space 5 has a constant depth over its length. According to yet another variation, the space 26 may have a constant depth over one part of its length at a progressively decreasing depth over another part of its length.

It is preferred to arrange each race member 23 in a manner such as to confine fluid within each clearance space 26 and in particular inhibit escape laterally over the peripheral edges of the rotor discs 19 and 20. In the preferred construction shown, that is achieved by having side flanges 31 of each race member 23 closely overlap the peripheral edge portions of the rotor discs 19 and 20 (see figure 4).

Each of the fluid conduits 8 provides a separate source of pressurized fluid and may terminate with an appropriate nozzle 32. As best shown in figures 1 and 3, each nozzle 32 is arranged at an angle so as to direct a stream of fluid towards the periphery of the rotor 9 and generally in the intended direction of rotation. Also, each nozzle 32 is arranged so that the emitted fluid stream will impinge upon a pocket leading end 14 as the respective pocket 13 approaches the inlet end 30 of the clearance space 26, and also after that leading end 14 has entered the space 26. Any appropriate fluid, such as water or steam, may be used to operate the turbine.

When the stream of fluid emitted by each nozzle 32 strikes the leading end 14 of an adjacent pocket 13, a rotating impulse will be applied to the rotor 9. Considering then the pocket 13 which is entering a clearance space 26 under those conditions, it will be appreciated that the fluid trapped in that pocket 13 will be subjected to a progressively increas-

ing radial confinement because of the nature of the race surface 25. That confinement will tend to drive the fluid towards the trailing end 18 of the pocket 13, but that action is inhibited by the rearward outward slope of the pocket base. In the result, an hydraulic effect will be created within the pocket 13 which will increase the forward driving influence on the rotor 9. Furthermore, fluid within the confines of the race member 23 will tend to move outwards under centrifugal action, but that is prevented by the member 23 and in addition, the curved nature of the surface 25 introduces an inward influence on the fluid. The combined effect is to generate another forwardly driving force on the leading end 14 of the pocket 13.

31626/77

With the arrangement shown, air tends to be drawn into the inlet end 30 of each clearance space 26 by the influence of the fluid stream and that air is trapped between the body of the fluid contained in the pockets 13 and the inner surface 25 of the race member 23. That air is believed to provide a lubricating seal between the periphery of the rotor 9 and the race members 23.

It will be seen that in the construction shown, a forward driving force is being generated continuously within each of the three pockets 13 confined by each of the two race members 23. In the result there is a high energy applied to the rotor 9 and that will exist even with relatively low pressure fluid sources. The diametrically opposed relationship of the race members 23 in the construction shown, provides a relatively balanced arrangement, but as previously mentioned the turbine will operate with only one race member and only one fluid source.

Figures 6 to 10 of the drawings show ~~a variation in~~ the construction of the rotor pockets 13. In this particular construction, each pocket 13 is formed by a channel member 31 having a base 16a which is contoured as for the pocket base 16 previously described. Side walls 32 of the member 31 are bent over as best seen in figures 8 to 10 to form inwardly sloping flanges 33 and in the preferred arrangement shown, the free longitudinal edges of those flanges are spaced from one another and also from the base 16a. A

gap thereby exists between the flanges 33 and a fluid confining channel 35 is formed at the inner side of each flange 33.

The result of the foregoing construction is that a body of fluid fills the central region of the pocket 13 by extending through the gap 34 to impinge against both the race surface 25 and the pocket base 16a. Another body of fluid is trapped within each channel 35 and bears against the confining flange 33 because of its tendency to move radially outwards under the influence of centrifugal action. The resulting pressure build-up within the channel 35 seeks release in the direction of rotation of the rotor 9 and thereby creates a self energizing effect. The rotor of a turbine according to the invention incorporating this type of pocket construction has been found to experience a significant increase in acceleration at speeds at or about 500 RPM without any increase in energy input thereby indicating the presence of a self energizing effect.

As best seen in figure 8 a slight gap 36 is formed between the periphery of the plates 19 and 20 and the turned over edge of the member 31. That gap 36 is believed to encourage turbulance at the sides of the pocket 13 which aids the creation of a seal between the rotor 9 and the race 23.

Obviously, the constructions particularly described can be modified in a number of ways. One possible modification is to interconnect a plurality of rotors so as to obtain a high torque drive.

Finally, it is to be understood that various alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the spirit or ambit of the invention as defined by the appended claims.

The claims defining the invention are as follows:

1. A fluid motor or turbine including; a rotor having a plurality of pockets provided around its periphery and each being elongated in the circumferential direction of said rotor and having a depth radial of said rotor which increases progressively in said circumferential direction at least over part of the length of said pocket, said increase in depth being in the intended direction of rotation of said rotor; each said pocket being formed between spaced side walls forming part of or being attached to said rotor so that the pocket is open to entry and exit of fluid only at said periphery; a channel formed along each of two opposite longitudinal sides of each said pocket, each said channel being defined between the base of the pocket and a respective flange which overlies portion of that base, and a gap exists between the two said flanges; a stator having at least one race member arranged to extend around portion of said rotor periphery and having an inner surface adjacent said periphery and spaced therefrom by a clearance space, said portion extending over a distance around the circumference of said rotor greater than the circumferential length of the peripheral opening of a said pocket; and a fluid source arranged to introduce pressurized fluid into each said pocket as it approaches and/or enters an inlet end of said clearance space; said race member being operative to confine the said pressurized fluid received within each said pocket to substantially prevent escape of the fluid from the pocket until the pocket begins to emerge from an outlet end of said clearance space.

2. A fluid motor or turbine according to claim 1, wherein part of the length of each said flange slopes inwardly from the adjacent pocket side wall towards said pocket base.

3. A fluid motor or turbine according to claim 1 or 2, wherein said fluid source includes a nozzle arranged to direct a stream of said pressurized fluid generally in said intended direction of rotation and so that said stream can impinge on the leading end of each said pocket both before and after that leading end enters said clearance space inlet end.

4. A fluid motor or turbine according to any preceding claim, wherein there is a plurality of said race members and a gap exists between the said clearance space outlet end of each

said race member and the said clearance space inlet end of an adjacent said race member, and a separate said fluid source is provided adjacent each said clearance space inlet end.

5. A fluid motor or turbine according to any preceding claim, wherein the leading end of each said pocket is arcuate and provides a concave surface against which said pressurized fluid can impinge.

6. A fluid motor or turbine according to any preceding claim, wherein, in each said pocket, there is a gradual increase in said pocket depth over a substantial part of the pocket length, and there is a relatively sharp increase in said depth adjacent the leading end thereof to define a region of maximum depth having an arcuate base which merges with said leading end.

7. A fluid motor or turbine according to any preceding claim, wherein a narrow land region separates the trailing end of each said pocket from the leading end of an adjacent said pocket.

8. A fluid motor or turbine according to any preceding claim, wherein the or each said race member or a member connected thereto overlaps or lies close to said rotor periphery on each side of said pockets so as to inhibit escape of fluid laterally from the or each said clearance space.

DATED: 7th November, 1979

JOHN THOMAS BLOOMER
By his Patent Attorneys:
PHILLIPS, ORMONDE AND FITZPATRICK

David P Fitzpatrick

AJ

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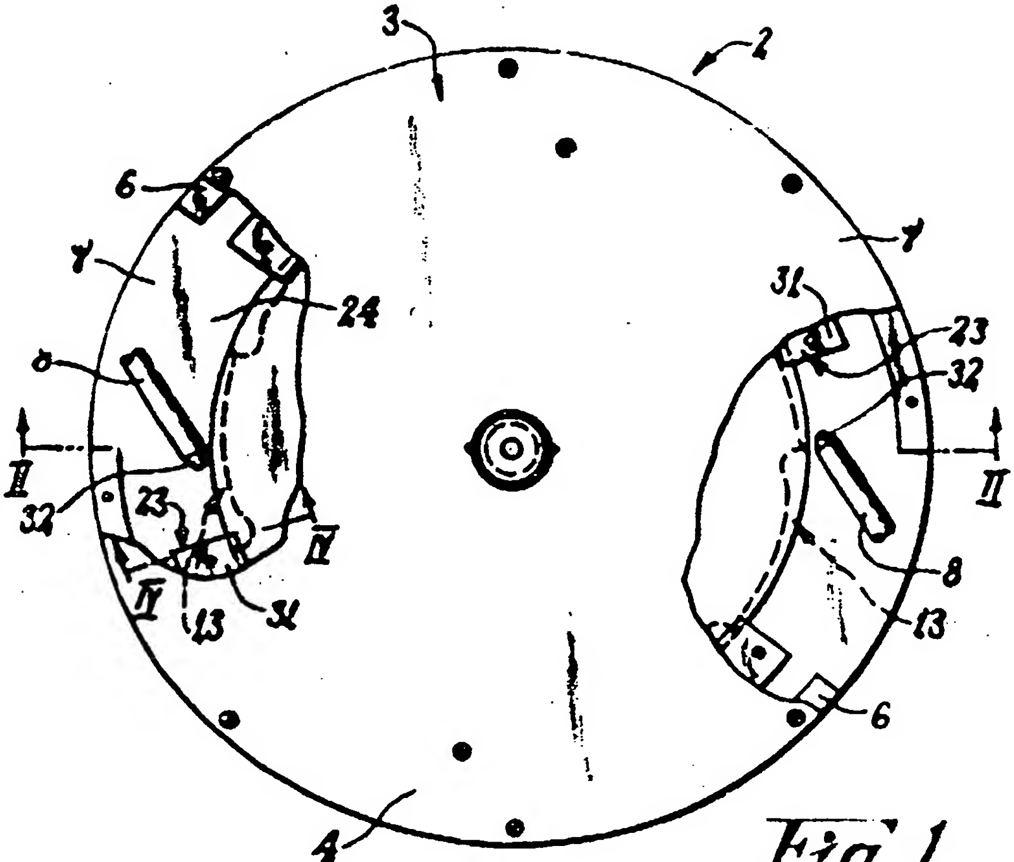

Fig 1

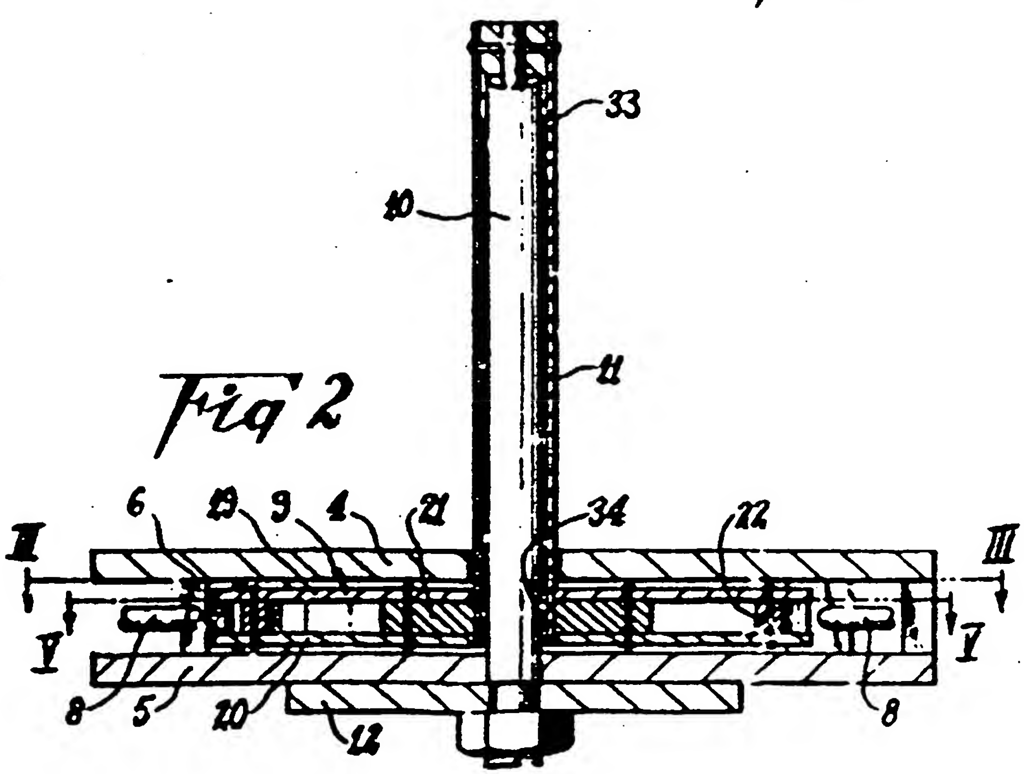

Fig 2

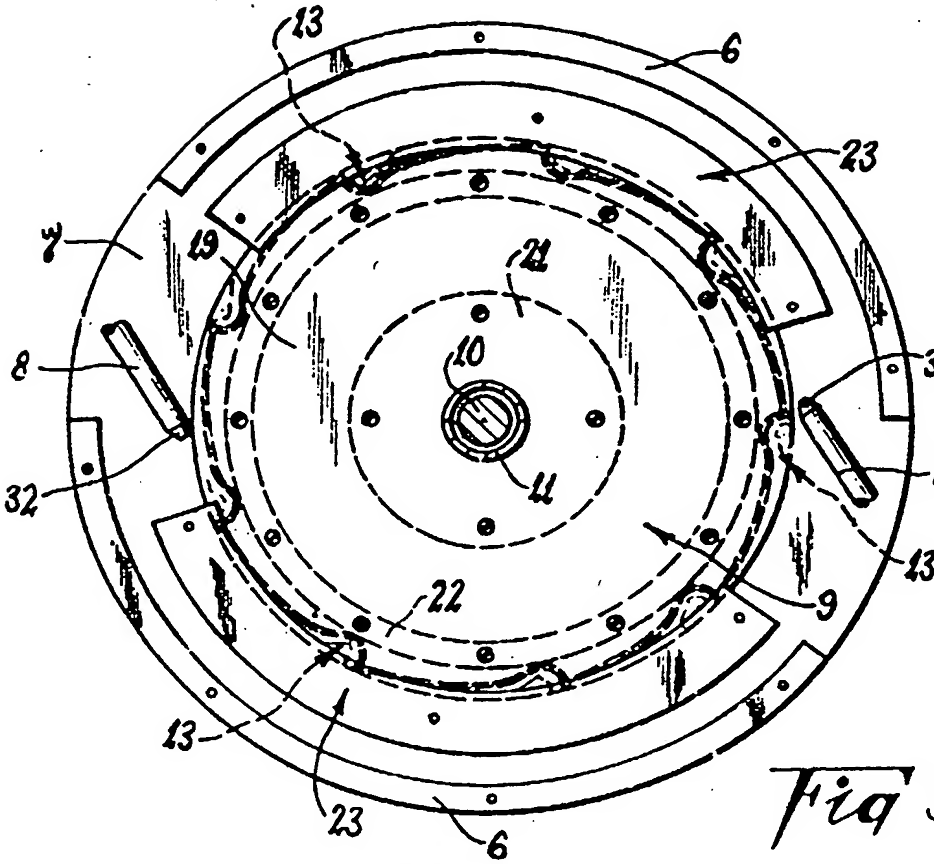

Fig 3

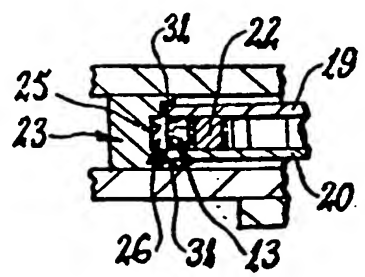

Fig 4

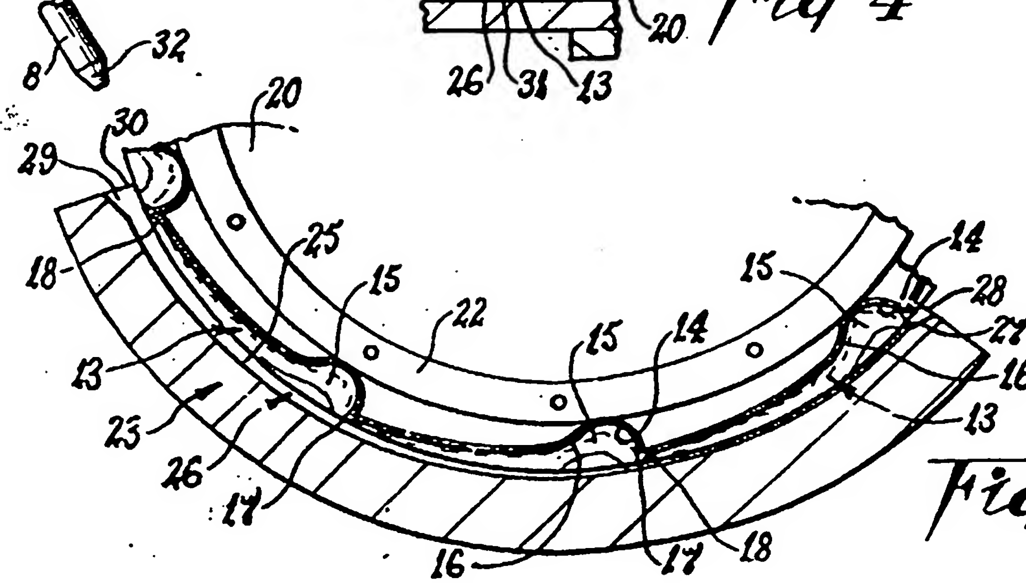

Fig 5

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